CLAIMS

What is claimed is:

1. A method for detecting changes in incident optical radiation, comprising:

driving current through one or more active areas of a detector while the incident optical radiation illuminates the active areas; and

sensing voltage across one or more of the active areas, a change in the voltage being indicative of the changes in incident optical radiation.

2. The method of claim 1, further comprising utilizing an observation instrument in the step of sensing voltage.

3. The method of claim 1, the step of sensing voltage comprising determining cyclical variations in the voltage to isolate one or more frequencies with signal strength above a noise floor.

4. The method of claim 1, the step of sensing comprising determining transient variation in the voltage in one or both of a time domain and a frequency domain.

5. The method of claim 1, the step of sensing comprising determining periodic variation in the voltage in one or both of a time domain and a frequency domain.

6. The method of claim 1, the step of sensing comprising utilizing one or more of a spectrum analyzer and oscilloscope.

7. The method of claim 1, further comprising determining motion of an object surface that causes the changes in incident optical radiation.

8. The method of claim 7, the step of determining comprising analyzing the voltage in a time domain.

9. The method of claim 7, the step of determining comprising analyzing the voltage in a frequency domain.

10. A method for determining surface motion, comprising:

illuminating a surface with a laser having a wavelength that is smaller than defined geometric features of the surface; and

detecting moving speckle indicative of surface motion by:

driving current through one or more active areas of a detector while the moving speckle illuminates the active areas;

sensing voltage across one or more of the active areas to detect the surface motion.

11. The method of claim 10, the step of sensing comprising determining voltage signals in a time-domain.

12. The method of claim 10, the step of sensing comprising determining voltage signals in a frequency-domain.

13. The method of claim 10, the surface motion comprising surface displacement.

14. A method for determining surface motion, comprising:

generating an interference pattern that varies with surface motion; and

detecting the interference pattern by:

driving current through one or more active areas of a detector while the interference pattern illuminates the active areas; and

sensing voltage across one or more of the active areas to detect the surface motion.

15. The method of claim 14, the step of sensing comprising determining voltage signals in a time-domain.

16. The method of claim 15, the step of sensing comprising determining voltage signals in a frequency-domain.

17. The method of claim 14, the surface motion comprising surface displacement.

18. A sensor for detecting changes in incident optical radiation, comprising:

a detector having one or more active areas formed of photoconductive material;

a source for applying current through the active areas; and

electronics for determining voltage drop across at least one of the areas, the voltage drop being indicative of the changes in incident optical radiation.

19. The sensor of claim 18, the source comprising one of a constant current source, a voltage source, a time-varying current source, and a time-varying voltage source.

20. The sensor of claim 18, the electronics connected to the source and configured to modulate the source so that current is modulated through the active areas at a desired frequency, to improve signal to noise.

21. The sensor of claim 18, the detector, source and electronics configured to provide a four point measurement.

22. The sensor of claim 18, further comprising an optical fiber and a laser, the laser generating a laser beam into one end of the optical fiber, the detector arranged to detect the laser beam, as the incident optical radiation, at the other end of the optical fiber, the voltage drop being indicative of perturbations on the optical fiber.

23. The sensor of claim 22, the optical fiber comprising either a single mode fiber or a multi-mode fiber.

24. The sensor of claim 18, further comprising an array of optical fibers and one or more lasers generating one or more laser beams into first ends of the optical fibers, the active areas forming one of a two-dimensional and three-dimensional array matched to the array of optical fibers to detect the laser beams, as the incident optical radiation, at second ends of the array of optical fibers, wherein voltage drops across the active areas indicate perturbations on the array of optical fibers.

25. The sensor of claim 24, the array of optical fibers comprising either single mode fibers or multi-mode fibers.

26. The sensor of claim 18, further comprising a laser, a power splitter, and an optical fiber coupled to the power splitter; the laser generating a laser beam into one the power splitter; the laser beam exiting the optical fiber, reflecting off of a surface and reentering the optical fiber to interfere with the laser beam within the optical fiber; the detector arranged to detect interfering laser radiation, as the incident optical radiation, from the power splitter, the voltage drop being indicative of motion of the surface.

27. The sensor of claim 26, the power splitter comprising one of a multi-mode fiber and bulk optics power splitter.

28. The sensor of claim 18, further comprising one or more lasers, an array of power splitters, and an array of optical fibers coupled to the power splitters; the lasers generating one or more laser beams into one the power splitters; the laser beams exiting the array of optical fibers, reflecting off of one or more surfaces and reentering the array of optical fibers to interfere with laser beams within the optical fibers; the active areas arranged as one of a two-dimensional and three-dimensional array to detect interfering laser radiation, as the incident optical radiation, from the power splitters, voltage drops across the active areas being indicative of motion of the surfaces.

29. The sensor of claim 18, further comprising input electrodes coupled to the source to drive the current through the active areas, and output electrodes coupled to the electronics to sense the voltage drop across the active areas.

30. The sensor of claim 29, the electrodes and active areas being collinear.

31. An optical radiation detector, comprising:
photoconductive material forming one or more active areas;
input electrodes for connection to a source to drive current through the active areas; and
output electrodes for connection to an observation instrument to sense voltage drop across one or more of the active areas.

31. The detector of claim 31, the photoconductive material comprising a semiconductor.

32. The detector of claim 31, the photoconductive material comprising one of a III-V semiconductor and a II-VI semiconductor, the III-V semiconductor being defined by one or more components of the composition from the III column of the periodic table, and one or more components of the composition from the V column, the II-VI semiconductor being defined by one or more components of the composition from the II column of the periodic table, and one or more components of the composition from the VI column.

33. The detector of claim 31, the active areas, input electrodes and output electrodes being collinear.

34. The detector of claim 31, the detector being configured for a four-point measurement.

35. The detector of claim 31, further comprising the photoconductive material disposed between the electrodes and the active areas.

36. The detector of claim 31, further comprising resistive material disposed between the electrodes and the active areas.

37. The detector of claim 31, further comprising semiconductive material disposed between the electrodes and the active areas.

38. The detector of claim 31, further comprising a mask to block incident optical radiation incident on at least one of the active areas.

39. The detector of claim 31, the active areas comprising at least three active areas, wherein a first one of the active areas separates a first input electrode from a first output electrode, and wherein a second one of the active areas separates a second input electrode from a second output electrode, such that current flows from the first input electrode through the active area and to the second input electrode, such that the first input and output electrodes do not short-circuit, and such that the second input and output electrodes do not short-circuit.

40. The detector of claim 31, the active areas forming one of a two-dimensional and three dimensional array.

41. The detector of claim 40, the two-dimensional and three dimensional array, is used to detect the output from a matching array of optical fibers.

42. A method for assessing relative position between two objects, comprising:

generating an interference or diffraction pattern dependent upon a distance between the two objects; and

sensing changes in the interference or diffraction pattern to achieve optimal alignment between the objects by:

driving current through one or more active areas of a detector while the interference or diffraction pattern illuminates the active areas; and

sensing voltage across one or more of the active areas, a change in the voltage being indicative of a change in the distance between the objects.

43. The method of claim 42, the step of generating comprising illuminating a gap between the objects with a laser.

44. A method for assessing relative angles between two objects, comprising:

generating an interference or diffraction pattern dependent upon an angular relationship between the two objects; and

sensing changes in the interference or diffraction pattern to achieve optimal alignment between the objects by:

driving current through one or more active areas of a detector while the interference or diffraction pattern illuminates the active areas; and

sensing voltage across one or more of the active areas, a change in the voltage being indicative of a change in the angular relationship between the objects.

45. A method for detecting the relative intensities of incident optical, comprising:

driving current through two or more active areas of a detector while incident optical radiation illuminates the active areas; and

sensing voltage across the active areas, voltage ratios across the active areas being indicative of intensity ratios of the incident optical radiation.